

Claims

1. Gear change mechanism for a gear box in which changes of gear ratio in the gearbox are made mechanically in response to actuating signals,

5 the mechanism including first and second actuator assemblies each connected to a gearbox gear change selector,

the selector being movable about an axis and in the direction of said axis to a plurality of positions for effecting changes of gear in the gearbox,

10 the first actuator assembly being arranged to move the selector in said axial direction between a plurality of axial positions,

the second actuator assembly being arranged to move a gear change selector about said axis between a plurality of rotational positions,

15 each of the first and second actuator assemblies including cylinder means, a shaft located in the cylinder means and drivingly connected to the selector, and piston means located about said shaft,

in each case the cylinder means, shaft and piston means together define chambers into which pressure fluid is selectively introduced so that the shaft is movable to at least three positions.

20 2. A gear change mechanism according to claim 1 wherein the three positions of the shaft of each actuator assembly include two end positions and a position intermediate the ends.

25 3. A gear change mechanism according to claim 2 wherein the intermediate position is at substantially equal spacings from the end positions.

4. A gear change mechanism according to claim 1 wherein there are at least two intermediate positions providing at least four positions of the shaft, and the positions are regularly spaced between the end positions.

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5. A gear change mechanism according to any one of the preceding claims wherein the cylinder means, shaft and piston means provide four chambers within the cylinder means and each chamber is connectable to a source of pressure fluid, connection being selectable to effect movement of the shaft to any one of said positions.

6. A gear change mechanism according to claim 5 wherein said chambers are arranged to define a first pair of chambers at opposite ends of the cylinder means, each chamber of the pair being defined by the shaft, one end of an annular piston located around the shaft, and the associated end of the cylinder means.

7. A gear change mechanism according to claim 6 wherein the chambers are arranged to define a second pair of chambers and each chamber of the second pair is defined by the shaft, by the opposite end of the annular piston and by a part of the cylinder means located inwardly of the ends of the cylinder means.

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8. A gear change mechanism according to any one of claims 5, 6 or 7 comprising inlet means for admitting pressure fluid to said chambers fluid being admitted to said first pair of chambers to locate said shaft in an intermediate position, fluid being admitted to one of said second pair of chambers to move the shaft towards one or other end of the cylinder means.

9. A gear change mechanism according to any one of the claims 5 to 8 comprising two fluid control valves selectively operable to admit fluid to the chambers and thereby move the shaft towards one of the end positions, or to the intermediate position.

10. A gear change mechanism for a gearbox in which changes of the gear ratio in the gearbox are made mechanically in response to actuating signals,

the mechanism including first and second actuator assemblies each connectable to a gearbox gear change selector, the gear change selector being rotatable about an axis and being movable in the direction of said axis to a plurality of positions for effecting changes of gear ratio in the gearbox,

5 the first actuator assembly including cylinder means and a shaft, the shaft being movable relative to the cylinder means between end positions and an intermediate position between the ends, to rotate the selector about its axis,

a second actuator assembly including cylinder means and a shaft, the shaft being movable relative to the cylinder means between the opposite end positions and two positions intermediate its ends, thereby to move the selector to
10 any one of four positions in its direction along said axis.

11. A gear change mechanism according to claim 10 wherein the actuator assemblies each include a pair of annular pistons located about the associated
15 shaft and four fluid chambers are defined within the associated cylinder means between the shaft, the annular pistons, and the cylinder means, and each chamber is connectable to a source of pressure fluid.

12. A gear change mechanism according to claim 11 wherein said chambers
20 are arranged to define a first pair of chambers at opposite ends of the cylinder means, each chamber of said first pair being defined by the shaft, one end of one of the pair of annular pistons, and the associated end of the cylinder means.

13. A gear change mechanism according to claim 12 wherein a second pair
25 of chambers is located within the cylinder means and each chamber of the second pair is defined by the shaft, by the opposite end of one of the annular pistons, and by a part of the cylinder means located inwardly of the ends of the cylinder means.

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14. A gear change mechanism according to any one of claims 6, 7, 11, 12 or 13 wherein the annular pistons are each located about an associated, reduced-section portion of the shaft, and each piston is movable axially of the shaft in limited extent which is defined by the length of the reduced-section portion.

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15. A gear change mechanism according to claim 14 wherein the length of the reduced-section portions towards each end of the shaft is different.

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10 16. A gear change mechanism according to any one of claims 1 to 15 wherein the shaft is movable towards one end of the cylinder means by the admission of fluid to one of the pair of first chambers situated at the opposite end of the shaft to said one end, to provide two end positions of the shaft.

15 17. A gear change mechanism according to claim 13 wherein, during operation, there is a constant supply of pressure fluid to both of said second chambers.

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20 18. A gear change mechanism according to claim 6, 12 or 13 wherein the shaft is movable towards one of said two intermediate positions by admitting fluid to both said first chambers.

19. A gear change mechanism according to claims 13 wherein pressure fluid is admitted to both said second chambers and not to either of said first chambers,

25 to move the shaft to the other of said intermediate positions.

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30 20. A gear change mechanism according to any one of claims 10 to 19 wherein two fluid control valves control the movement of the shaft to the end positions and the two intermediate positions.